APPLYING MOBILE APPLICATION DEVELOPMENT LIFE CYCLE IN THE DEVELOPMENT OF FASTING TRACKER ANDROID APPLICATION

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ABSTRACT

Fasting is the 3rd pillar of Islam. Fasting during Ramadhan is compulsory for every Muslim. Therefore, muslim women who are unable to fast during Ramadhan such as woman in menstruation, or in child-birth bleeding, pregnant women and nursing mother will be charged as fidyah based on certain condition. Most of the women have a problem to remember how many days they missed their fasting in Ramadhan and when they have to replace (qada’) their fasting. The objective of this research is to develop an Android application for fasting and fidyah. To make this research successful, an Android application will be developed for user to track fasting by using Mobile Application Development Lifecycle (MADLC) method which includes seven phases: identification, design, development, prototyping, testing, deployment and maintenance. The purpose of this research is to help Muslims women to track their fasting and know the amount of fidyah they need to pay based on the day and year they left fasting as well as the information about fasting and fidyah based on Quran and sunnah.

Keywords: Fasting, fidyah, Mobile Application Development Lifecycle (MADLC).
1.0 INTRODUCTION

As the world become more and more interconnected, technology has begun to be considered as a convenient and useful tool in human’s daily life. Every single thing that they are doing was depending on the technology. For example, the way human’s communicate with each other. The mobile phones have constantly enhanced communication to allow for varied features to be performed far beyond what was there initially. Nowadays, Android is the most widely used mobile operating system. Smartphones have become ubiquitous the existence and the driving force behind these smartphones is possibly the Android operating system.

The Quran which is descended as means to give guidance towards followers of Prophet Muhammad SAW as a manual in life so that it parallels with the desire of their Creator which suitable with their status as servants and khaliifah in this world. In Quran, there are several verses that discusses about fasting. It is mentioned in surah al-Baqarah verse 183 about the obligation of fasting on 10th Syaaban in the second of Hijrah.

"Believers, fasting is decreed for you as it was decreed for those before you, so that you may be God-fearing." (Al-Quran. Al-Baqarah 2:183)

After the verse descended, fasting in Ramadhan becomes an obligation for the Muslim for the whole month by following the conditions and pillars mentioned in surah al-Baqarah verse 185.

"The month of Ramadan in which was revealed the Qur'an, a guidance for mankind and clear proofs for the guidance and the criterion (between right and wrong). So whoever of you sights (the crescent on the first night of) the month (of Ramadan i.e. is present at his home), he must observe Saum (fasts) that month,
and whoever is ill or on a journey, the same number [of days which one did not observe Saum (fasts) must be made up] from other days. Allah intends for you ease, and He does not want to make things difficult for you. (He wants that you must complete the same number (of days), and that you must magnify Allah [i.e. to say Takbir (Allahu-Akbar; Allah is the Most Great) on seeing the crescent of the months of Ramadan and Shawwal] for having guided you so that you may be grateful to Him.” (Al-Quran. Al-Baqarah 2:185)

For people who cannot fast because of certain conditions, they need to make up fasting by replacing it or paying *fidyah* for each day that they did not perform fasting (Al-Khin et al., 1992). Based on verse 184 in surah al-Baqarah, Imam at-Tabari in his opinion mentioned that pregnant women and breast-feeding women are allowed to break their fast if they worried about their baby in the womb or suckler even though they are able to fast (Al-Tabari, 1987). *Fidyah* is related with fasting because of the person who is extremely old and do not have the strength to fast, and the person who is extremely ill and do not have any hope of recovering nor the strength to fast have to give stipulated food to poor people equivalent to the amount stipulated for *sadaqatul fitr* in place of every fast that they miss. Alternatively, they could feed one poor person with two complete meals for each fast that they missed. In Shariah this is known as *fidyah*. It is also permissible for such persons to give the value of the grain in cash.

Nowadays, mobile phones have become one of the most significant interfaces for internet use, especially given their role as facilitating access for previously marginalized populations and individuals (Noorul Izzatthol Akhbariee, 2012). The mobile technology has also been changing the religion landscape especially Islam where the dissemination of knowledge is not only restricted to books, preaching or radio anymore but can go beyond those boundaries (Ismassabah et al., 2013). Mobile platform for Islamic knowledge dissemination has been carried out in various content such as Islamic medication expert system (Jung et al., 2008), mobile dictionary for pilgrims (Akram et al., 2012) and prayer application (Susan et al., 2008). In addition there are various Islamic application including Quran reader pro, qibla direction, prayer times, adzan, prayers, halal food guide and Islamic hotline (Bunt, 2010). With the innovation of ICT especially the internet and mobile technology, the Islamic knowledge dissemination should also keep abreast with the technology (Ismassabah et al., 2013).
The purpose of the system is to develop a product based on Naqli-Aqli Integration as contribution to ummah development. This Android application named “Fasting Tracker Android Application” can give a lot of benefits to Muslim society and organization in which they can get clear understanding about \textit{fidyah}. Besides that, the system will be more systematic, accurate, efficient and user friendly. The calculator system provided is to help eliminate human error. All the data will be kept in the database which will save the space, paper and protect the data from missing.

\section{2.0 RELATED WORK}

The purpose of this literature review is to get more understanding on how an Android application is develop using different approaches. Before the framework of the system is presented in detail, the researcher will briefly discuss a summary of some published work in research and development on an Islamic Android application by using various methods as a model.

For literature survey of published work in research and development on Islamic content mobile applications, there are some projects that have been discovered. Nurfarah Ain (2015), have proposed to apply mobile application development life cycle model (MADLC) as a method in the development of Fast Track Fasting Replacement Recommender Mobile Application Using Rule-Based. This project is focus to develop a mobile application for fasting replacement recommendation and aiming to give the suggestion day for user to do fasting replacement by using ruled-based technique. The suggestion day based on the rules obtained from an expert. As a result, it shows that the respondents mostly agreed to have fasting replacement recommendation application. Even though the developer provide a system that can be used by Muslim women to organize their fasting replacement days, but it is still not providing the calculation of \textit{fidyah} if the users are not able to finish their fasting replacement within the specified period. Instead of track their fasting, user also not provide the information about fasting and \textit{fidyah} which is that information will be more helpful to users to become more aware about their obligation in Islam. Besides that, it is propose to include the Quranic versus and Hadith about the obligation of fasting and paying \textit{fidyah} in this application.

Fenty \textit{et al.} (2014) have proposed to apply mobile application development life cycle approach (MADLC-Approach) in the development of Zakat al-Mal mobile web application
using JQuery Mobile Framework. JQuery Mobile is a development platform of JQuery, which provides a variety of user-interface elements and features for use in mobile application. This system can help users to calculate the amount of zakat that should be issued, in the form of zakat per unit amount of the type of property and the calculation of the total amount of all assets owned. Users can also receive an e-mail notification containing the amount of zakat that should be issued along with the list of any assets that have been entered such as Nissab and Haul. It can be accessed by any platform and delivers speed, stability, and an excellent cross-browser experience for web mobile visitors. However, this system is only focused on zakat al-mal only and did not cover about fasting and fidyah and it is limited to one school of jurisprudence only.

Arifah Fasha et al. (2016) have developed a mobile fidyah calculator by using Waterfall Model. It uses a sequential design process, in which progress is seen as flowing steadily downwards and is frequently used in software development process. The processes involved in the project are: planning, gathering information, design, development, testing and documentation. As a whole, the system is only covered on fidyah calculation and did not include on fasting tracker.

Norhasnira & Nur Afiah (2016) have proposed to develop a fidyah calculation in an Android system based on al-Quran and as-Sunnah by using ADDIE model as a method. The ADDIE model is the generic process traditionally used by instructional designers and training developers. The five phases – analysis, design, development, implementation and evaluation – represent a dynamic, flexible guideline for building effective training and performance support tools. However, this project is only focus on fidyah calculation only and it is using ADDIE model which the model is using to develop the user interface only.

3.0 APPLYING MADLC TO DEVELOP FASTING TRACKER ANDROID APPLICATION

As the mobile applications have complex functionality and are different from the desktop applications, the following Mobile Application Development Lifecycle model (MADLC) (Anureet, 2016; Anureet & Kulwant, 2015; Fenty et al., 2014; Jamie Foo, 2015; Mamouni et al., 2016; Muhammad Adil & Nafees, 2015; Maizeatul Nasira, 2015; Nurfarah Ain, 2015; Salim, M Nordin & Abdul Hakim, 2015; Vithani & Kumar, 2014) is proposed to enable a systematic
approach in development of Android application for fasting and *fidyah* named *Fasting Tracker Android Application*. MADLC will be divided into seven processes as follows: identification, design, development, prototyping, testing, deployment and maintenance. This lifecycle has been used for over a year in developing Android applications. This lifecycle addresses some of the distinguishing characteristics of mobile applications like life span, complex functionalities, fewer physical interfaces, more number of screens for interaction, battery and memory usage, cross platform development and maintenance. The preliminary indicators are that this will benefit the mobile developers to follow the development process within MADLC to build robust and optimal control applications (Muhammad Adil & Nafees, 2015).

### 3.1 Identification

The objective of this phase is to come out with a new idea or improvements to the existing application (Vithani & Kumar, 2014). The developer analyze and categorizes the ideas (Fenty *et al*., 2014). The ideas can come from the customer or from the developers (Muhammad Adil & Nafees, 2015; Vithani & Kumar, 2014).

In this project, the application is categorized into four domains which are:

i. Fasting calendar, where the user can track their fasting by using this calendar as well as give a reminder to user to replace fasting.

ii. *Fidyah* calculator, where the user can calculate their *fidyah* as well as the amount of *fidyah* they should pay based on fasting calendar.

iii. Information domain, give complete *fidyah* information to the user.

iv. Fasting and *fidyah* in Quranic and sunnah studies, give an explaination to the user about fasting and *fidyah* based on authentic Quranic verses and hadith.

### 3.2 Design

In design phase, the idea from developer is develop into an initial design of the application (Muhammad Adil & Nafees, 2015; Vithani & Kumar, 2014). Developer designs architecture of the application. According to Muhammad Adil & Nafees (2015), the feasibility of developing the application on all mobile platforms is determined. Alternatively, the specific target mobile
platform is identified. In this phase, developer needs to design a model of the database and the system graphical user interface.

Initial design created using Use-Case Diagram of UML (Unified Modeling Language) (Booch et al., 2004; Keng & Qing, 2001; Martin, Fabian, & Mark, 2007; Nenad et al., 2002) by using Star UML software as a tool. Star UML software is functioned to design models of the software development life cycle, data flow diagram and entity relationship diagram. The use case diagram for the system is as Figure 3.1 below:

![Use case diagram for Fasting Tracker Android application.](image)

Sequence diagram is creating to shows the flow of the system. A sequence diagram is an interaction diagram that shows how objects operate with one another and in what order. It is a construct of a message sequence chart. A sequence diagram shows object interactions arranged in time sequence. The sequence diagram for the system is as below:
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Figure 2: Sequence Diagram Login process

Figure 3: Sequence Diagram User Input Data

Figure 4: Sequence Diagram Fasting Calendar
Figure 5: Sequence Diagram Track Fasting

Figure 6: Sequence Diagram Notes
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Figure 7: Sequence Diagram Fasting Analysis

Figure 8: Sequence Diagram Fidyah on Quran & Sunnah
In sequence diagram above, the user will have to login first before the application can display the main page and they can track their fasting. For the first time login, user need to input their personal data such as the days they have left fasting for the previous year. Then, the user can choose to use any available function from the main page of the application. The user will then can track their fasting whether they left fasting or replace it and the system will perform fasting analysis based on the data they already input. From the result of the fasting analysis, the system can also display the amount of *fidyah* that the user need to pay if any as well as the information of the fasting and *fidyah*.

### 3.3 Development

In this phase, the application is coded. Coding for different module of the same prototype can be proceed in parallel (Fenty *et al.*, 2014; Muhammad Adil & Nafees, 2015; Vithani & Kumar, 2014). Throughout the system development, there is a tool that has been used to assist the process involved in the development of the project. The tool required is Android Studio, where it is the official Integrated Development Environment (IDE) for Android app development. This software is used to design the interface of the system and program the module of the system.
The graphical user interface (GUI) of the application is designed based on appropriate icons and buttons. Developer will use Adobe Photoshop and Adobe Illustrator to design the GUI. The function of the software is to design user interface and icons of the application as inputs for the system. The design of the interface for the main page is as figure below:

![Main page design](image)

**Figure 10: Main page design**

Besides, to develop this application, there is hardware and software requirements that need to be specify as listed below:

i. **Hardware requirement**
   a. Operating system windows 8 64-bit.
   b. Processor core i5.
   c. RAM 8GB.
   d. Storage space at least 40GB.

ii. **Software requirement**
a. Android developer tools: to develop application on smartphone Android with version Android Lollipop and above.
b. Java JDK 6.
c. XAMPP 1.7.3 for PHP and MySql function.
d. SQLite: for application database.

3.4 Prototyping

In this phase, the functional requirements of each prototype are analyzed (Fenty et al., 2014; Vithani & Kumar, 2014). Developer creates and tests the prototype. After feedback is received from the potential user, the required changes are implemented through the development. The work done in this prototyping phase is documented and then forwarded to the testing phase (Muhammad Adil & Nafees, 2015). The tool required in this process is same as in development process. The prototype of each page of the Android application shows below:

Figure 11: Main page of the application

Figure 12: Fasting Calendar Page
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Figure 13: Notes Page
Figure 14: My Fasting Page
Figure 15: Fasting in Quran and Sunnah Page
Figure 16: Fidyah Calculator Page
3.5 Testing

Testing is one of the important phases of any development lifecycle model (Muhammad Adil & Nafees, 2015; Vithani & Kumar, 2014). The application is testing based on use-case diagram by using black-box testing method.

Black-box testing method (Fenty et al., 2014; Ik Seo & Man Choi, 2006) is a fundamental aspect of testing system without peering into its internal structures of software. This method is used to determine whether the software is functioning properly. Black-box testing method is a design method to test a data based on software specifications. The test data generated and executed on the software and then the output of the software is checked whether the expected result is successful (Deddy Sucipta et al., 2016).

In this project, random users have been asking to test the application either each of the page is function or not. The application is tested during the competition of an innovation that has been conduction.

3.6 Deployment

Deployment is the final phase of the development process. After the testing is completed and the final feedback is obtained, the application is ready for the deployment. The application is uploaded to the appropriate application store for user consumption.

3.7 Maintenance

The maintenance is the final phase and it is a continuous process. Feedback is collected from users. If required, changes are made in the form of from bug fixes or any improvements.

4.0 CONCLUSION

Based on the description and discussion of the previous chapter, it can be concluded that this research resulted in a fasting tracker Android application development that can display information and knowledge about fasting and fidyah by using smartphones. Information and knowledge about fasting and fidyah displayed a more complete, consists of understanding fidyah, the law of fidyah, the rate of fidyah, type of fidyah, how to calculate fidyah and how to pay
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(fidyah. The Android application can help users to track fasting and calculate the amount *fidyah* that should be issued. Besides, user will get a reminder from the application to replace fasting before the incoming Ramadhan. Hence, Mobile Application Development Life Cycle (MADLC) model can be applied into the development process of fasting tracker Android application. This model efficiently helps developer to build an Android application.
REFERENCES


